

other's behavior, deviations from which may prompt adjustment of their own attitude" (p. 169). Charlotte Hemelrijk's chapter on reciprocity complements this theme. In two articles on chimpanzee and bonobo intelligence, Sue Savage-Rumbaugh and her colleagues consider ape language experiments and Tetsuro Matsuzawa examines symbol and tool use. Having long conducted language experiments on captive apes, Savage-Rumbaugh et al. recount their efforts in the field to discover whether the failure of wild-ape studies to find examples of symbolic communication owes to 1) scientists' reluctance to report what they see, or to 2) apes having no such system. Their provisional conclusion is that bonobos *do* have such a system and use vegetation in an intentionally symbolic manner.

In the following section (Part Five), William McGrew and Linda Marchant's chapter on laterality in hand use and John Mitani's on African ape vocal behavior continue this comparative perspective on the ape mind. The remaining two chapters are similarly comparative, Diane Doran's on positional behavior and Barbara Fruth and Gottfried Hohmann's on nest-building behavior.

Part Six considers great apes as models for ourselves. I read Jim Moore's article fully expecting to find a review of chimpanzee models for reconstructing the behavior of our early ancestors, but in addition I found an innovative and challenging critique of "what a model is," and better yet, "what it is not." Moore advocates a referential approach in which "the model is not a single typological modern species per se, but the

set of differences observed between populations" (p. 285). Adrienne Zihlman, in her chapter on chimpanzee models, suggests several features favoring a *Pan paniscus* model for early human origins. Finally, Junichiro Itani's Afterword, "A New Milestone in Great Ape Research," concludes and summarizes the volume with an interesting historical perspective on primatology.

The book contains a valuable Appendix of great ape study sites. The information on each of the 18 study-site reports include information on location, climate, vegetation, human influence, predators, conservation efforts, other primates present, and current research interests. This is an excellent resource for those interested in comparative study.

As richly evidenced by this volume, one must be impressed by the steep trajectory of great ape research over the past 20 years. Although it is exciting to project what the year 2014 may hold in store, we can only hope that the orangutans—those facing slaughter as they flee Indonesian fires—and the chimpanzees and gorillas—those facing decimation by the African bushmeat crisis—will survive as resources for our continued learning.

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FROM LUCY TO LANGUAGE. By Donald Johanson and Blake Edgar. Prospect Heights, IL: Simon and Schuster. 1996. 272 pp. ISBN 0-684-81023-9 \$50.00 (cloth).

This book does not begin with Lucy or end with language. In fact, neither figures prominently in the text nor in the gallery of photographs which fill the pages. The text recognizes *Ardipithecus* as the first homi-

nid, states that language probably existed in Neanderthals, and ends with a photograph of a Magdalenian harpoon. A better title might be "From *Ardipithecus* to the Upper Paleolithic," but this lacks the ring of their title and does not recognize the senior author's discovery at Hadar.

The book is divided in two parts. The first, called "Central Issues of Paleoanthropology," deals with a wide range of subjects

from simple skeletal anatomy to politics in paleoanthropology to cultural aspects preserved in the fossil record. Forty-eight different topics are covered and many of them are accompanied by magnificent color pictures to illustrate central points. The second part, titled "Encountering the Evidence," is an impressive collection of photographs and text describing individual specimens in the hominid fossil record. Whether in the first or second parts, the book's great strength and appeal are the photographs, especially the ones composed by David Brill, the "principal photographer." Virtually all the specimens are shot on black backgrounds and are well-lit, affording excellent detail. The result is a stunning guide to the primary specimens in the hominid fossil record. In many respects, the fossils never looked better and surely these will be seen by many students for years to come, since the frequent comment I have heard about the book is that the "pictures would make great slides." It is too bad the authors did not include the images on a CD-ROM or make some arrangement to acquire legal slides of the photographs.

From the standpoint of photographic documentation, whether used as a reference or in the classroom as supplementary reading, the book is an important addition to the literature. It is moderately priced and includes views of every type specimen of the various species of *Australopithecus* and *Homo* they recognize. For example, following the splitter's perspective, they distinguish nine species of *Australopithecus* (*afarensis*, *aethiopicus*, *africanus*, *anamensis*, *bahrelghazali*, *boisei*, *crassidens*, *praegens*, *robustus*) and seven species of *Homo* (*erectus*, *ergaster*, *habilis*, *heidelbergensis*, *neanderthalensis*, *rudolfensis*, *sapiens*). Most of the crania or mandibles defining these species are reproduced in multiple views at actual size. There are many other specimens included, so the book allows access to a wide variety of crucial hominid fossils. After seeing this book, it will be difficult to adopt any of the catalogues which consist solely of line drawings, even if they are less expensive.

Despite the overall excellence of the pictures, there are a few problems with them. The photographs contributed by people other

than Brill are relatively easy to spot. Many look like some of my slides of specimens taken over the years—some with depth-of-field problems, some with reflections from the lights on the fossils, and some not lighted in a way to maximize detail. Those still taking measurements from photographs should be careful here. Some specimens, such as Saniran (pp. 192–193), are at different scales; others like Mauer (p. 197) are too small, and still others, like the Kebara hyoid (p. 107), which is about 1.5 times natural size, are too big. There is also a strange composition of some Klasies specimens (p. 42), with the frontal/nasal fragment shown upside down and the robust zygomatic rotated 90 degrees from normal anatomical position. The spectacular burial from the Gravettian zone at Arene Candide is reversed (p. 101) and from a cast. The original in Genoa-Pegli is much more striking and it is unfortunate Brill has not gone there to capture its image. Still, it is hard to fault the truly beautiful, cover-to-cover rendering of the fossils and artifacts.

While the photographs are superb, the text has problems which detract from the overall quality of the book. These are scattered through the pages and often involve fundamental errors of fact or basic interpretation. Some examples are: labelling the buccinator groove as the retromolar space (p. 20), suggesting that 800 of the 850 human bones from Krapina (p. 93) show evidence of cut marks and bludgeoning (it is much less than this), suggesting that "[m]odern *Homo sapiens* brains average 1200 cc" (p. 117), listing 207 bones in the human skeleton (p. 124), defining the diastema as "a gap between the canine and the upper first premolar" (p. 147), listing Gibraltar as a "Mediterranean island" (p. 230), and so on. Other misstatements will surely rile some people. The comment that Gorjanović-Kramberger collected the Krapina remains "unfortunately without archeological techniques" (p. 93) will irritate colleagues from Croatia to California. Gorjanović, in fact, excavated the site in layers, catalogued the bones and artifacts according to the strata in which they were found, did fluorine tests to confirm the contemporaneity of the human and extinct mammals, and even saved a column for

subsequent analysis (Radovčić, 1988). Compared to work done by contemporaries further west, Gorjanović was decades ahead of his time. Others will not like the phylogenetic tree of human evolution (p. 38), where *Homo heidelbergensis*, represented by specimens from Mauer, Bodo, Arago, Petralona, Steinheim, Atapuerca, and Kabwe, is considered the ancestral species to all subsequent *Homo*. According to Johanson and Edgar, *heidelbergensis* may have split from *ergaster* 1.5 million years ago and gave rise to *neanderthalensis* and modern *Homo sapiens* across the Old World and Australia. This closely follows Tattersall's thinking, but later the authors appear to hedge when they note a number of morphological similarities between the Javanese specimens (which they lump into *Homo erectus*) and early Australians as represented by Kow Swamp. Then, these links are discounted and attributed to head binding and "unknown environmental factors" (p. 247). There are other evolutionary models which make fewer assumptions and do not attribute Indonesian-Australian links in cranial morphology to such improbabilities and vagaries.

Finally, there are a number of statements in the book which defy explanation. I cannot make sense of the following quote: "The scattered migration of individuals tends not to leave any genetic traces and in fact will reduce the total genetic diversity by blending traits that would otherwise distinguish more isolated populations. Mass migrations of people, however, do tend to increase diversity by stimulating genetic drift—in which novel mutations will more likely arise and be inherited by subsequent generations—and adaptation to new environments" (p. 49). I also wonder about the statement characterizing *Homo sapiens* as "the most cooperative of all animals that have ever existed" (p. 113).

The best feature of the book is the photo-documentation and the photographs provide rich detail for testing or verifying certain statements and observations about the fossil record. Morphological observations the authors make can be easily checked—like the purported absence of the retromolar space in the Qafzeh and Skhul hominids (see pp. 240 and 243) or the statement that Dali

has "just a typical Middle Pleistocene face, with resemblances to the modern humans of Qafzeh" (p. 234). Just flip back and forth between the shots of Qafzeh (pp. 240–241) and Dali (pp. 234–235) and attempt to identify some facial similarities. Then, compare Dali to the *Homo heidelbergensis* specimens they depict (pp. 195–210) to justify the statement that "the shape of the Dali skull could reflect the spread of *Homo heidelbergensis* into Asia." There is a widely dispersed, highly variable sample in this "taxon," but adding Dali to it, by some unexplained migration from the West, creates more problems than it solves. Another interesting exercise is to try to blindly identify the continent of origin for the recent *Homo sapiens* skulls shown in facial and lateral views on pp. 59–71. I presented these to my osteology class and used the features listed by forensic anthropologists to identify race (e.g., Gill and Rhine, 1990). We were successful in identifying the Zairian, German, and Chinese skulls and were much less accurate in pinpointing the continent of origin for the South Indian, Solomon Islander, and Eskimo. Those who continue to report the lack of success in identifying geographic markers in cranial remains or that there is little basis for regional differentiation should spend some time inspecting these photographs.

In short, virtually everyone will find a use for this book and it will satisfy those who agree or disagree with the authors' perspective as expressed in the text. *From Lucy to Language* could never serve as a primary textbook in the classroom, but it is essential as a reference volume and catalogue. At the price it is an easy purchase and everyone should add this book to their library.

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